FINAL ADDENDUM TO ECONOMIC ANALYSIS OF CRITICAL HABITAT DESIGNATION FOR THE CAROLINA HEELSPLITTER

May 2002

PREFACE

The U.S. Fish and Wildlife Service has added this preface to all economic analyses of critical habitat designations:

"The standard best practice in economic analysis is applying an approach that measures costs, benefits, and other impacts arising from a regulatory action against a baseline scenario of the world without the regulation. Guidelines on economic analysis, developed in accordance with the recommendations set forth in Executive Order 12866 ("Regulatory Planning and Review"), for both the Office of Management and Budget and the Department of the Interior, note the appropriateness of the approach:

> *'The baseline is the state of the world that would exist without the proposed action. All costs and benefits that are included in the analysis should be incremental with respect to this baseline.'*

"When viewed in this way the economic impacts of critical habitat designation involve evaluating the 'without critical habitat' baseline versus the 'with critical habitat' scenario. Impacts of a designation equal the difference, or the increment, between these two scenarios. Measured differences between the baseline and the scenario in which critical habitat is designated may include (but are not limited to) changes in land use, environmental quality, property values, or time and effort expended on consultations and other activities by federal landowners, federal action agencies, and in some instances, State and local governments and/or private third parties. Incremental changes may be either positive (benefits) or negative (costs).

"In New Mexico Cattle Growers Ass'n v. U.S.F.W.S., 248 F.3d 1277 (10th Cir. 2001), however, the 10th Circuit recently held that the baseline approach to economic analysis of critical habitat designations that was used by the Service for the southwestern willow flycatcher designation was 'not in accord with the language or intent of the ESA.' In particular, the court was concerned that the Service had failed to analyze any economic impact that would result from the designation, because it took the position in the economic analysis that there was no economic impact from critical habitat that was incremental to, rather than merely co-extensive with, the economic impact of listing the species. The Service had therefore assigned all of the possible impacts of designation to the listing of the species, without acknowledging any uncertainty in this conclusion or considering such potential impacts as transaction costs, reinitiations, or indirect costs. The court rejected the baseline approach incorporated in that designation, concluding that, by obviating the need to perform any analysis of economic impacts, such an approach rendered the economic analysis requirement meaningless: 'The statutory language is plain in requiring some kind of consideration of economic impact in the CHD phase.'

"In this analysis, the Service addresses the 10th Circuit's concern that we give meaning to the ESA's requirement of considering the economic impacts of designation by acknowledging the

uncertainty of assigning certain post-designation economic impacts (particularly section 7 consultations) as having resulted from either the listing or the designation. The Service believes that for many species the designation of critical habitat has a relatively small economic impact, particularly in areas where consultations have been ongoing with respect to the species. This is because the majority of the consultations and associated project modifications, if any, already consider habitat impacts and as a result, the process is not likely to change due to the designation of critical habitat. Nevertheless, we recognize that the nationwide history of consultations on critical habitat is not broad, and, in any particular case, there may be considerable uncertainty whether an impact is due to the critical habitat designation or the listing alone. We also understand that the public wants to know more about the kinds of costs consultations impose and frequently believe that designation could require additional project modifications.

"Therefore, this analysis incorporates two baselines. One addresses the impacts of critical habitat designation that may be 'attributable co-extensively' to the listing of the species. Because of the potential uncertainty about the benefits and economic costs resulting from critical habitat designations, we believe it is reasonable to estimate the upper bounds of the cost of project modifications based on the benefits and economic costs of project modifications that would be required due to consultation under the jeopardy standard. It is important to note that the inclusion of impacts attributable co-extensively to the listing does not convert the economic analysis into a tool to be considered in the context of a listing decision. As the court reaffirmed in the southwestern willow flycatcher decision, 'the ESA clearly bars economic considerations from having a seat at the table when the listing determination is being made.'

"The other baseline, the lower boundary baseline, will be a more traditional rulemaking baseline. It will attempt to provide the Service's best analysis of which of the effects of future consultations actually result from the regulatory action under review - i.e. the critical habitat designation. These costs will in most cases be the costs of additional consultations, reinitiated consultations, and additional project modifications that would not have been required under the jeopardy standard alone as well as costs resulting from uncertainty and perceptional impacts on markets."

DATED: March 20, 2002

INTRODUCTION

In July 2001, the U.S. Fish and Wildlife Service (the Service) proposed designation of critical habitat under the Endangered Species Act of 1973, as amended (the Act) for the Carolina heelsplitter (*Lasmigona decorata)* on portions of the Lynches River and nine creeks in North Carolina and/or South Carolina. Because the Act also calls for an economic analysis of the critical habitat designation, the Service released a *Draft Economic Analysis of Critical Habitat Designation for the Carolina Heelsplitter* (hereafter *DEA*) for public review and comment in March 2002.[1]

This addendum to the *DEA* addresses issues raised in the public comments to the *DEA*. As such, the Addendum considers newly available information and revisits the assumptions and analytic conclusions presented in the *DEA* in light of the new information. In summary, the impacts included in this Addendum include:

- Responses to public comments on the *DEA* itself, where appropriate; and
- Additional information received through personal communications with Action agencies, in regard to public comments on the *DEA*.

REVISIONS TO THE DRAFT ECONOMIC ANALYSIS

The following sections describe the implications of, and responses to, public comments to the *DEA*, as well as additional research on the analysis presented in the *DEA*. A number of the revisions affect the magnitude of the expected costs of this designation. The revised estimates result from evaluation of the information provided by the public during the comment period and additional research conducted pursuant to these public comments. Furthermore, section 4 of the *DEA* has been modified to update the consultation, technical assistance, and project modification costs and presents the expected costs of this designation by proposed critical habitat unit. Section numbers presented in the headers of this Addendum refer to the section numbers of the *DEA*.

[1] Copies of the *Draft Economic Analysis of Critical Habitat Designation for the Carolina Heelsplitter* are available by writing to the Field Supervisor, U.S. Fish and Wildlife Service, Asheville Field Office, 160 Zillicoa Street, Asheville, NC 28801.

SECTION 3 IMPACTS OF SECTION 7

The following section presents an expanded discussion of the types and (where data is available) likely magnitude of impacts associated with both the listing of the heelsplitter and subsequent designation of critical habitat for the species. The time period over which impacts are estimated is 10 years.

3.1 Impacts of Section 7 Implementation on Activities Affecting Critical Habitat Units in North Carolina

3.1.2 Road and Bridge Construction

The North Carolina Department of Transportation (NCDOT) commented that many NCDOT projects requiring section 7 consultations for aquatic species have involved bridge replacement projects. NCDOT also emphasized the difficulty of estimating the number of projects that will require formal consultation, but noted that the department actively works to avoid the need for formal consultation. Based on new information provided by NCDOT, this analysis estimates that two formal consultations in Unit 1 and one consultation in Unit 2 will occur over the next ten years.

NCDOT also commented that critical habitat for the heelsplitter had not been designated during the construction of the East Charlotte Outer Loop in Mecklenburg County, North Carolina. Therefore, the word "critical" has been deleted from paragraph 46 of the *DEA*.

Section 3.2 Impacts of Section 7 Implementation on Activities Affecting Critical Habitat Units in South Carolina

3.2.2 Road and Bridge Construction

The South Carolina Department of Transportation (SCDOT) commented that it is currently undertaking an accelerated construction program, including: roadway widenings, new location construction, and bridge replacements. SCDOT believes that the proposed critical habitat designation may affect the Agency's efforts to complete projects affecting the four proposed units in South Carolina. Based on the past consultation history and the South Carolina *Statewide Transportation Improvement Program* (STIP) five year transportation program, this analysis estimates that the Service will conduct one informal consultation in Unit 3 and two informal consultations in Unit 4 with the U.S. DOT over the next ten years regarding road construction and

bridge replacement activities.[2]

3.2.3 Residential Development

Pursuant to the Section 4 of the Endangered Species Act, which requires the Service to consider economic impacts associated with each proposed critical habitat unit, predicted future consultations are now presented by unit. Based on the past consultation history, this analyis predicts five informal consultations in Unit 6 over the next ten years.[3]

3.3 Summary of Impacts

Exhibits 3-1 and 3-2 summarize the potential for consultations and other impacts on activities affecting the heelsplitter and its proposed critical habitat. Exhibit 3-3 presents the number of informal and formal consultations by unit. Importantly, these reflect the total consultation and technical assistance profiles associated with the proposed designation, regardless of whether these activities can be attributed co-extensively to the listing. As a result, these estimates reflect an upper-bound estimate of the potential impact associated with designation of critical habitat.

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[2] Personal communication with South Carolina Department of Transportation, April 19, 2002; *Statewide Transportation Improvement Program: South Carolina's Five Year Transportation Program, October 1, 2000 - September 30, 2005.*

[3] Personal communication with U.S. Army Corps of Engineers, Charleston District Office, South Carolina, January 11, 2002.

Exhibit 3-1

UPPER-BOUND ESTIMATE OF THE TOTAL NUMBER OF ACTIVITIES AFFECTING THE HEELSPLITTER AND ITS PROPOSED CRITICAL HABITAT NORTH CAROLINA (TEN YEARS)

Landowner or Manager	Current or Future Activities	Federal Nexus	Technical Assistance	Future Consultations	
				Informal	Formal
Private Landowners	Residential Development	ACOE section 404 permit	70	75	5
	Road/Bridge Construction	US DOT funding	50	25	3
	Interbasin transfer of water	FERC	n/a	0	1
	Beaver damage management	USDA	n/a	1	0
	Flood Response	FEMA	n/a	2	0
	EPA Water Quality Standards	EPA oversight	10	10	0
Total			**130**	**113**	**9**

Exhibit 3-2

UPPER-BOUND ESTIMATE OF THE TOTAL NUMBER OF ACTIVITIES AFFECTING THE HEELSPLITTER AND ITS PROPOSED CRITICAL HABITAT SOUTH CAROLINA (TEN YEARS)

Landowner or Manager	Current or Future Activities	Federal Nexus	Technical Assistance	Future Consultations	
				Informal	Formal
Private Landowners	Residential Development	ACOE section 404 permit	25	5	0
	Road/Bridge Construction	US DOT funding	45	3	0
	Forestry	US Forest Service	n/a	170	0
	EPA Water Quality Standards	EPA oversight	n/a	10	0
Total			**70**	**188**	**0**

Exhibit 3-3

UPPER-BOUND ESTIMATE OF THE TOTAL NUMBER OF ACTIVITIES AFFECTING THE HEELSPLITTER AND ITS PROPOSED CRITICAL HABITAT BY UNIT (TEN YEARS)

Unit	Current or Future Activities	Informal Consultations	Formal Consultations[a]
1	Residential Development	50	3
	Road/Bridge Construction	15	2
	EPA Water Quality Standards	5	0
	Interbasin Transfer of Water	0	1
2	Residential Development	25	2
	Road/Bridge Construction	10	1
	Beaver Damage Management	1	0
	Flood Response	2	0
	EPA Water Quality Standards	5	0
3	Road/Bridge Construction	1	0
	EPA Water Quality Standards	2	0
4	Road/Bridge Construction	2	0
	EPA Water Quality Standards	2	0
5	Forestry	100	0
	EPA Water Quality Standards	3	0
6	Residential Development	5	0
	Forestry	70	0
	EPA Water Quality Standards	3	0
Subtotal of Informal and Formal Consultations		301	9
Technical Assistance[b]			200
Total			**510**

[a] This analysis assumes that all of the consultations will involve costs to the Service, an Action agency, and a third party.
[b] Many of the technical assistance actions cannot be attributed to individual units. As such, total technical assistance actions have been reported separately.

ESTIMATE OF COSTS OF DESIGNATING CRITICAL HABITAT FOR THE HEELSPLITTER

This section presents an analysis of the section 7 costs associated with the heelsplitter and its proposed critical habitat, by unit. This analysis parallels that presented in Section 4 of the *DEA*. The consultation, project modification, and total cost tables presented in Section 4 of the *DEA* have been modified to reflect updates to the cost model.

4.2 Estimated Costs of Consultations and Technical Assistance

Estimates of the cost of an individual consultation reported in the *DEA* (Table 4-1) were developed from a review and analysis of historical section 7 files from a number of Service field offices around the country. The cost model developed from these files was recently updated. Therefore, the costs reported in Section 4 of the *DEA* have been modified to reflect this updated model.

Per-effort costs associated with formal consultations, informal consultations, and technical assistance calls are presented in Exhibit 4-1. The low and the high scenarios represent a reasonable range of costs for each type of interaction. For example, when the Service participates in technical assistance with a third party regarding a particular activity, the cost of the Service's effort is expected to be approximately $260 to $680. The cost of the third party's effort is expected to be approximately $600 to $1,500.

Exhibit 4-1

ESTIMATED ADMINISTRATIVE COSTS OF CONSULTATION AND TECHNICAL ASSISTANCE FOR THE HEELSPLITTER (PER EFFORT)

Critical Habitat Impact	Scenario	Service	Action Agency	Third Party	Biological Assessment	Total Cost
Technical Assistance Effort	*Low*	$260	$0	$600	$0	$860
	High	$680	$0	$1,500	$0	$2,180
Informal Consultation	*Low*	$1,000	$1,300	$1,200	$0	$3,500
	High	$3,100	$3,900	$2,900	$4,000	$13,900
Formal Consultation	*Low*	$3,100	$3,900	$2,900	$4,000	$13,900
	High	$6,100	$6,500	$4,100	$5,600	$22,300

Notes: Low and high estimates primarily reflect variations in staff wages and time involvement by staff.
Technical assistance calls also have educational benefits to the landowner or manager and to the Service.
Third parties are defined as State agencies, local municipalities, and private parties.
Biological Assessment costs apply to all formal consultations and all upper-bound (high) informal consultations.
Costs may not sum due to rounding.
Sources: IEc analysis based on data from the Federal Government General Schedule Rates, 2002, Office of Personnel Management, and level of effort information from Biologists in the U.S. Fish and Wildlife Service, Asheville, NC and Cookeville, TN Fish and Wildlife Offices.

Exhibit 4-2 displays revised estimates of the total consultation costs associated with activities affecting the proposed critical habitat for the heelsplitter. The cost estimates were calculated by multiplying the number of expected consultations or technical assistance calls (shown in Exhibits 3-1 and 3-2 of the *DEA*) by the per effort cost of these actions. Based on this analysis, the upper-bound total cost of consultations attributable to section 7 activities affecting the heelsplitter or its critical habitat is estimated to range from $1,119,000 to $4,261,000. The Federal government will incur the majority of the costs, with the Service incurring costs of $381,000 to $1,124,000 and other Federal agencies incurring costs of $426,000 to $2,005,000. Costs to the States of North Carolina and South Carolina, local municipalities, and private landowners are expected to range from $312,000 to $1,132,000.

Exhibit 4-2

ESTIMATED TOTAL CONSULTATION COSTS ATTRIBUTABLE TO POTENTIAL FUTURE SECTION 7 CONSULTATIONS ON THE HEELSPLITTER AND DESIGNATION OF CRITICAL HABITAT FOR THE HEELSPLITTER (TEN YEARS)

Action	Range	Costs to the Service	Costs to Other Federal Agencies	Costs to Third Parties	Total Costs
Technical Assistance	*Low*	$52,000	$0	$120,000	$172,000
	High	$136,000	$0	$300,000	$436,000
Informal Consultation	*Low*	$301,000	$391,000	$130,000	$822,000
	High	$933,000	$1,946,000	$745,000	$3,624,000
Formal Consultation	*Low*	$28,000	$35,000	$62,000	$125,000
	High	$55,000	$59,000	$87,000	$201,000
Total	***Low***	**$381,000**	**$426,000**	**$312,000**	**$1,119,000**
	High	**$1,124,000**	**$2,005,000**	**$1,132,000**	**$4,261,000**

Note: Third parties are defined as State agencies, local municipalities, and private parties.
Costs may not sum due to rounding.
Sources: IEc analysis based on data from the Federal Government General Schedule Rates, 2002, Office of Personnel Management, and information from biologists in the U.S. Fish and Wildlife Service, Asheville, NC office.

Exhibit 4-3

ESTIMATED SECTION 7 TECHNICAL ASSISTANCE AND CONSULTATION COSTS FOR THE HEELSPLITTER BY CRITICAL HABITAT UNIT (TOTAL OVER TEN YEARS)

Unit	Total Eforts	**Informal Consultations Total Costs**	**Total Efforts**	**Formal Consultations Total Costs**	**Total Costs**
Unit 1	70	$239,000-$958,000	6	$83,000-$134,000	$322,000-$1,092,000
Unit 2	43	$134,000-$541,000	3	$42,000-$67,000	$176,000-$608,000
Units 1 & 2	3	$7,000-$33,000	0	$0	$7,000-$33,000
Unit 3	3	$8,000-$36,000	0	$0	$8,000-$36,000
Unit 4	4	$12,000-$50,000	0	$0	$12,000-$50,000
Unit 5	103	$237,000-$1,133,000	0	$0	$237,000-$1,133,000
Unit 6	78	$185,000-$873,000	0	$0	$185,000-$873,000
Subtotal					
		$822,000-$3,624,000	9	$125,000-$201,000	$947,000-$3,825,000
Technical Assistance					200
					$172,000-$436,000
Total Number and Costs of Technical Assistance and Consultations		**301**	**9**		**510**
		$822,000-$3,624,000		**$125,000-$201,000**	**$1,119,000-$4,261,000**

[a] This analysis assumes that all of the consultations will involve costs to the Service, an Action agency, and a third party.
[b] Many of the technical assistance costs cannot be attributed to individual units. As such, total technical assistance costs have been reported separately.
Note: Costs may not sum due to rounding.

Section 4.3 Estimated Number and Costs of Forecast Project Modifications

Several commentors suggested that the estimated per-effort project modification costs presented in the *DEA* are too high. The sections below provide updated information on project modification costs.

4.3.1 Modifications Associated with Informal Consultations

- **Erosion and Stormwater Control Measures.** In order to ensure water quality, a primary constituent element for the heelsplitter, the Service often requests that the Action agency and/or the applicant install and maintain erosion and sediment control measures. Erosion and stormwater control measures may include providing buffer zones along stream banks, soil grading, seeding and/or mulching, and limiting earth-moving activities. Some projects may require additional, more elaborate stormwater control measures, such as rain gardens and man-made ponds.[4] The North Carolina Sedimentation Pollution Control Act of 1973 requires standard erosion controls on all projects. In addition, Union County, North Carolina is currently developing a stormwater control ordinance that may be implemented within the year. Some of the stormwater controls discussed here are likely to be required under this new ordinance. Thus, the project modification costs of erosion control measures for future projects, as described below, will likely be incurred even in the absence of the listing of the heelsplitter or designation of critical habitat. The following categories of activities are likely to involve erosion and stormwater control measures:

  (1) Residential development. ACOE estimates that 80 percent of stream and wetland fill projects associated with residential housing developments, which are permitted by the Army Corps of Engineers, will involve erosion and stormwater control modifications in the range of $1,000 to $2,000 per lot, depending on the type of erosion and stormwater controls used. If rain gardens are constructed, costs will tend to be at the high end of the range, since they may cost over $1,000 per lot. Housing developments may contain between 1 to 600 homes, but they typically contain 100 to 400 homes. Given the typical ranges of erosion control costs and number of lots, this analysis assumes that individual residential development projects will involve erosion control measures that range from

[4] Rain gardens, also known as bio-retention basins, use plants and soils to naturally filter pollutants from stormwater runoff, rather than discharging the runoff directly into streams. Rain gardens are created in low-lying areas and contain layers of soil, sand, and organic mulch, as well as riparian plants.

$100,000 to $800,000.[5] These costs are likely to be borne by the third party, in this case, the real estate developer.

(2) Road and bridge construction. Although standard erosion controls required under the North Carolina Sedimentation Pollution Control Act are implemented on all road and bridge projects, NCDOT may adopt additional erosion control measures as a result of section 7 activities. In particular, the presence of the heelsplitter would lead NCDOT to designate the proposed critical habitat units as environmentally sensitive areas. According to NCDOT, the most likely additional erosion control measure undertaken in environmentally sensitive areas is to delay grubbing in order to leave the existing ground cover and root mass in place for as long as possible, until just before grading. Delaying grubbing requires re-mobilization of equipment and labor, at an estimated per-effort cost of $10,000 for bridge projects and $5,000 for road projects.[6] NCDOT may also install special sediment control fencing, at minimal extra cost. These additional erosion control measures are associated with section 7 implementation, rather than baseline State regulations, and NCDOT estimates that 80 percent of informal consultations related to road and bridge projects will require such controls.[7] The cost of modifying road and bridge construction projects is likely to be borne by NCDOT or SCDOT, and/or the Federal Highway Administration.

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[5] Personal communication with U.S. Army Corps of Engineers, Asheville Regulatory Field Office, North Carolina, January 7, 2002.

[6] Personal communication with North Carolina Department of Transportation, Roadside Environmental Division, April 24, 2002.

[7] Personal communication with North Carolina Department of Transportation, December 21, 2001 and April 24, 2002.

- **Design Changes.** NCDOT commented that the design changes predicted in the *DEA* were inaccurate because road and bridge projects now address conservation issues in the early phases of planning, avoiding the need for late-stage modifications to project plans. Therefore, the analysis now assumes that future consultations on road and bridge projects will not involve design changes. It maintains the assumption that 80 percent of residential development projects will require design changes, and that altering project plans will represent a minor per-project cost, ranging from $5,000 to $10,000.[8]

- **Conservation Measures.** One commentor stated that the Conservation Measures paragraph of the *DEA* inaccurately uses cost figures for timber sales on the Sumter National Forest. According to this commentor, the Sumter National Forest lost $1.4 million on its timber sales in 1997; therefore, refraining from logging riparian zones in order to protect the heelsplitter might actually reduce the net costs of this program to the government.

  The *DEA* focuses on impacts to the local timber economy in the Sumter National Forest, and does not attempt to calculate whether the National Forest's timber sale program is profitable for these particular actions. Such an analysis for these particular forecast sales is beyond the scope of this analysis. The opportunity cost of lost timber sales due to the presence of a riparian buffer zone was derived using cost estimates from personnel at the Sumter National Forest, based on current base rates for timber sales. This analysis maintains the same cost estimates as the *DEA*, with the per-effort cost of conservation measures for the heelsplitter expected to range between $3,000 and $4,000.

4.3.2 Modifications Associated with Formal Consultations

NCDOT commented that the project modification costs reported in the *DEA* for formal consultations are consistently too high, and fail to take into account the cost savings that can stem from proactive conservation efforts initiated by Action agencies. For example, NCDOT is required to mitigate lost habitat under section 404 of the Clean Water Act. By preserving heelsplitter habitat, NCDOT can gain "preservation credits" that may be applied to other road and bridge construction projects, reducing mitigation costs for those projects. In addition, NCDOT emphasized their efforts to incorporate protective measures for endangered species early in the project planning stages. By incurring some minor additional costs early on, NCDOT can avoid adverse impacts to listed species and subsequently avoid entering the more costly formal consultation process.

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[8] U.S. Army Corps of Engineers, Asheville Regulatory Field Office, North Carolina, January 7, 2002.

This analysis acknowledges that the formal consultation project modification costs outlined in the *DEA* may be too high. Nevertheless, given that they are upper-bound costs, the analysis maintains the same project modification costs as the *DEA*, with the following exceptions:

- Based on new information from NCDOT, this analysis assumes that all formal consultations with U.S. DOT will incur project modification costs of $10,000 for bridge projects and $5,000 for road projects, as a result of delaying grubbing to protect the heelsplitter.

- This analysis assumes that only residential development projects will incur project modification costs associated with design changes, since road and bridge projects are expected to avoid design changes through improved early-stage planning.

4.3.3 Estimated Costs of Project Modifications

Exhibit 4-4 presents updated per-effort estimates of total project modification costs associated with section 7 activities affecting the heelsplitter and its critical habitat. Exhibits 4-5 and 4-6 present estimates of total project modification costs associated with section 7 activities affecting the heelsplitter. Exhibit 4-7 presents the project modifications for the heelsplitter by unit and type of modification.

Exhibit 4-4

ESTIMATED ECONOMIC COSTS ASSOCIATED WITH POTENTIAL PROJECT MODIFICATIONS (PER PROJECT)

Potential Project Modification (per project)	Activity	Informal		Formal	
		Low	High	Low	High
Erosion and Stormwater Control	Residential Development	$100,000	$800,000	$100,000	$800,000
	Road/Bridge Construction	$5,000	$10,000	$5,000	$10,000
Design Changes	Residential Development	$5,000	$10,000	$5,000	$10,000
Conservation Measures	Residential Development	$0	$0	$50,000	$150,000
	Road/Bridge Construction	$0	$0	$50,000	$150,000
	Forestry	$3,000	$4,000	$0	$0
Water Quality Monitoring	Residential Development	$0	$0	$5,000	$30,000
	Road/Bridge Construction	$0	$0	$5,000	$30,000
Habitat Restoration and Enhancement	Residential Development	$0	$0	$0	$200,000
	Road/Bridge Construction	$0	$0	$0	$200,000
Total	Residential Development	**$105,000**	**$810,000**	**$160,000**	**$1,190,000**
	Road/Bridge Construction	**$5,000**	**$10,000**	**$60,000**	**$390,000**
	Forestry	**$3,000**	**$4,000**	**$0**	**$0**

Note: Costs may not sum due to rounding.
Source: Based on IEc review of past consultation history and information from Service Biologists, Asheville, NC.

Exhibit 4-5

ESTIMATED SECTION 7 PROJECT MODIFICATION COSTS ASSOCIATED WITH INFORMAL CONSULTATIONS INVOLVING THE HEELSPLITTER (TOTAL OVER TEN YEARS)

Types of Project Modifications	Land Use Activity Affected	Per-Effort Cost of Project Modification	Number of Consultations Recommending Modification	Total Costs of Project Modifications
Erosion and Stormwater Control	Residential Development	$100,000-$800,000	64	$6,400,000-$51,200,000
	Road/Bridge Construction	$5,000-$10,000	23	$115,000-$230,000
Design Changes	Residential Development	$5,000-$10,000	64	$320,000-$640,000
Conservation Measures	Residential Development	$0	n/a	$0
	Road/Bridge Construction	$0	n/a	$0
	Forestry	$3,000-$4,000	85	$255,000-$340,000
Water Quality Monitoring	Residential Development	$0	n/a	$0
	Road/Bridge Construction	$0	n/a	$0
Habitat Restoration and Enhancement	Residential Development	$0	n/a	$0
	Road/Bridge Construction	$0	n/a	$0
Total Costs of Project Modifications				**$7,090,000-$52,410,000**

Note: Costs may not sum due to rounding.

Exhibit 4-6

ESTIMATED SECTION 7 PROJECT MODIFICATION COSTS ASSOCIATED WITH FORMAL CONSULTATIONS INVOLVING THE HEELSPLITTER (TOTAL OVER TEN YEARS)

Types of Project Modifications	Land Use Activity Affected	Per-Effort Cost of Project Modification	Number of Consultations Recommending Modification	Total Costs of Project Modifications
Erosion and Stormwater Control	Residential Development	$100,000-$800,000	5	$500,000-$4,000,000
	Road/Bridge Construction	$5,000-$10,000	3	$15,000-$30,000
Design Changes	Residential Development	$5,000-$10,000	5	$25,000-$50,000
Conservation Measures	Residential Development	$50,000-$150,000	5	$250,000-$750,000
	Road/Bridge Construction	$50,000-$150,000	3	$150,000-$450,000
Water Quality Monitoring	Residential Development	$5,000-$30,000	5	$25,000-$150,000
	Road/Bridge Construction	$5,000-$30,000	3	$15,000-$90,000
Habitat Restoration and Enhancement	Residential Development	$0-$200,000	5	$0-$1,000,000
	Road/Bridge Construction	$0-$200,000	3	$0-$600,000
Total Costs of Project Modifications				**$980,000-$7,120,000**

Note: Costs may not sum due to rounding.

In order to arrive at an estimate of total costs of future project modifications likely to be recommended as a result of section 7 activities for the heelsplitter, this analysis assumes that some percentage of the total consultations for each activity will result in modifications. The total number of consultations likely to recommend project modifications are calculated by multiplying the total number of consultations for each activity (Exhibits 3-1 and 3-2) by the percentage of consultations recommending the modifications for each activity as follows:

- Residential Development (informal): 80% (64); Formal: 100% (5)
- Road/Bridge Construction (informal): 80% (23); Formal: 100% (4)
- Forestry (informal): 50% (85)

Similarly, to calculate the number of consultations likely to recommend project modifications by unit, the total number of consultations for each activity per unit is multiplied by the percentage of consultations recommending the modifications for each activity (i.e., informal residential and road/bridge construction activities 80%; Informal forestry activites 50%).

Exhibit 4-7

ESTIMATED SECTION 7 PROJECT MODIFICATION COSTS FOR THE HEELSPLITTER BY CRITICAL HABITAT UNIT (TOTAL OVER TEN YEARS)

Unit Affected	Consultations Recommending Modification	Type of Project Modifications	Total Costs of Project Modifications
Unit 1	57	Erosion Control	$4,370,000-$34,540,000
	43	Design Changes	$215,000-$430,000
	5	Conservation Measures	$250,000-$750,000
	5	Water Quality Monitoring	$25,000-$150,000
	5	Habitat Restoration	$0-$1,000,000
Unit 2	31	Erosion Control	$2,245,000-$17,690,000
	22	Design Changes	$110,000-$220,000
	3	Conservation Measures	$150,000-$450,000
	3	Water Quality Monitoring	$15,000-$90,000
	3	Habitat Restoration	$0-$600,000
Unit 3	1	Erosion Control	$5,000-$10,000
Unit 4	2	Erosion Control	$10,000-$20,000
Unit 5	50	Conservation Measures	$150,000-$200,000
Unit 6	4	Erosion Control	$400,000-$3,200,000
	4	Design Changes	$20,000-$40,000
	35	Conservation Measures	$105,000-$140,000
Total Costs of Project Modifications			**$8,070,000-$59,530,000**

Note: Costs may not sum due to rounding.

4.4 Total Section 7 Costs

The cost estimates presented in Exhibit 4-8 are a function of the assumed number of project modifications associated with activities affecting the heelsplitter and its critical habitat, along with the per effort costs outlined above. Based on this analysis, the total section 7 costs for the heelsplitter may range from $8,070,000 to $59,530,000 over the next ten years. As noted in the addenda and the *DEA*, these estimates are more likely to over-state than under-state costs.

Exhibit 4-8

UPPER-BOUND ESTIMATE OF TOTAL PROJECT MODIFICATION COSTS ASSOCIATED WITH THE LISTING AND DESIGNATION OF CRITICAL HABITAT FOR THE HEELSPLITTER (TEN YEARS)

Action	Activity	Number of Consultations Requiring Modifications	Scenario	Project Modification Costs	Party Paying for Modifications
Informal Consultation Project Modification	Residential Development	64	*Low*	$6,720,000	Private developers (third party)
			High	$51,840,000	
	Road/Bridge Construction	23	*Low*	$115,000	DOT (action agency)
			High	$230,000	
	Forestry	85	*Low*	$255,000	U.S. Forest Service (action ageny)
			High	$340,000	
	Total	172	*Low*	$7,090,000	
			High	$52,410,000	
Formal Consultation Project Modification	Residential Development	5	*Low*	$800,000	Private developers (third party)
			High	$5,950,000	
	Road/Bridge Construction	3	*Low*	$180,000	DOT (action agency)
			High	$1,170,000	
	Total	8	*Low*	$980,000	
			High	$7,120,000	
Total Project Modification Costs		**180**	*Low*	**$8,070,000**	
			High	**$59,530,000**	

Note: Third parties are defined as State agencies, local municipalities, and private parties.
* The number of consultations requiring modifications is based on the assumption that 80 percent of residential and road/bridge construction, and 50 percent of forestry informal consultations, and 100 percent of residential and road/bridge construction formal consultations with the ACOE, U.S DOT, and the U.S. Forest Service, will require modifications.
Note: Costs may not sum due to rounding.
Sources: IEc analysis based on data from the Federal Government General Schedule Rates, 2002, Office of Personnel Management, and information from biologists in the U.S. Fish and Wildlife Service, Asheville, NC Field Office.

4.6 Economic Impacts Associated Solely with the Designation of Critical Habitat

The cost estimates presented in Exhibit 4-9 are an indication of the total costs that may be associated with future potential section 7 consultations on the heelsplitter and its designated critical habitat over the next ten years. These represent costs likely to be incurred by the Service, Federal Action agencies, and non-Federal third parties for activities having a Federal nexus, which would require consultation under section 7 of the Act. However, the listing of the heelsplitter and the resultant Federal responsibility to avoid projects that would jeopardize the continued existence of the species is likely to trigger all of the impacts presented in the *DEA*. Therefore, the technical assistance efforts, section 7 consultations, and project modifications presented in Exhibits 4-9 and 4-10 are likely to occur over the next ten years even if critical habitat is not designated.

Exhibit 4-9

ESTIMATED TOTAL CONSULTATION COSTS ATTRIBUTABLE TO POTENTIAL FUTURE SECTION 7 CONSULTATIONS ON THE HEELSPLITTER AND ITS CRITICAL HABITAT (TEN YEARS)

Action	Range	Costs to the Service	Costs to Other Federal Agencies	Costs to Third Parties	Total Costs
Technical Assistance	*Low*	$52,000	$0	$120,000	$172,000
	High	$136,000	$0	$300,000	$436,000
Informal Consultation	*Low*	$301,000	$391,000	$130,000	$822,000
	High	$933,000	$1,194,000	$745,000	$3,624,000
Formal Consultation	*Low*	$28,000	$35,000	$62,000	$125,000
	High	$55,000	$59,000	$87,000	$201,000
Informal Consultation Project Modifications	*Low*	$0	$370,000	$6,720,000	$7,090,000
	High	$0	$570,000	$51,840,000	$52,410,000
Formal Consultation Project Modifications	*Low*	$0	$180,000	$800,000	$980,000
	High	$0	$1,170,000	$5,950,000	$7,120,000
Total Costs	*Low*	**$381,000**	**$976,000**	**$7,832,000**	**$9,189,000**
	High	**$1,124,000**	**$3,745,000**	**$58,922,000**	**$63,791,000**

Note: Third parties are defined as State agencies, local municipalities, and private parties.
The large range between the lower- and upper-bound cost estimates is attributable to the uncertainty associated with the average size of residential developments and the per-effort project modifications that may be required.
Costs may not sum due to rounding.
Sources: IEc analysis based on data from the Federal Government General Schedule Rates, 2002, Office of Personnel Management, and information from biologists in the U.S. Fish and Wildlife Service, Asheville, NC office.

Exhibit 4-10

TOTAL SECTION 7 COSTS ASSOCIATED WITH THE LISTING AND DESIGNATION OF CRITICAL HABITAT FOR THE HEELSPLITTER BY UNIT (TEN YEARS)

Unit	Informal Consultations	Formal Consultations	Informal Consultations with Project Modifications	Total Section 7 Costs
Unit 1	$239,000-$958,000	$83,000-$134,000	$4,860,000-$36,870,000	$5,182,000-$37,847,000
Unit 2	$134,000-$541,000	$42,000-$67,000	$2,520,000-$19,050,000	$2,696,000-$19,658,000
Units 1 & 2	$7,000-$33,000	$0	n/a	$7,000-$33,000
Unit 3	$8,000-$36,000	$0	$5,000-$10,000	$13,000-$46,000
Unit 4	$12,000-$50,000	$0	$10,000-$20,000	$22,000-$70,000
Unit 5	$237,000-$1,133,00	$0	$150,000-$200,000	$387,000-$1,333,000
Unit 6	$185,000-$873,000	$0	$525,000-$3,380,000	$710,000-$4,253,000
Total	$822,000-$3,624,000	$125,000-$201,000	$8,070,000-$59,530,000	$9,017,000-$63,355,000
Total Technical Assistance				$172,000-$436,000
TOTAL	**$822,000-$3,624,000**	**$125,000-$201,000**	**$8,070,000-$59,530,000**	**$9,189,000-$63,791,000**

Note: Costs may not sum due to rounding.
The large range between the lower- and upper-bound cost estimates is attributable to the uncertainty associated with the average size of residential developments and the per-effort project modifications that may be required.

POTENTIAL BENEFITS OF PROPOSED CRITICAL HABITAT

Several of the comments received on the *DEA* addressed the failure of the *DEA* to address the benefits associated with the designation of critical habitat for the heelsplitter. There is little disagreement in the published economics literature that real social welfare benefits can result from the conservation and recovery of endangered and threatened species (Bishop (1978, 1980), Brookshire and Eubanks (1983), Boyle and Bishop (1986), Hageman (1985), Samples *et al.* (1986), Stoll and Johnson (1984). Such benefits have also been ascribed to preservation of open space and biodiversity (see examples in Pearce and Moran (1994) and Fausold and Lilieholm (1999) both of which are associated with species conservation. Likewise, a regional

economy can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.

It is not feasible, however, to fully describe and accurately quantify these benefits in the specific context of this economic analysis. For example, most of the studies in the economics literature do not allow for the separation of the benefits of listing (including the Act's take provisions) from the benefits of critical habitat designation. The discussion presented in this report provides examples of potential benefits, which derive primarily from the listing of the species, based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of the benefits that could result from section 7 of the Act in general or critical habitat designation in particular. In short, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.

REFERENCES

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